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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,624	07/30/2003	Naoki Shutoh	241072US2SRD	9134
22850 7590 12/22/2010 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
PHASGE, ARUN S				
ART UNIT		PAPER NUMBER		
1724				
NOTIFICATION DATE		DELIVERY MODE		
12/22/2010		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/629,624

Applicant(s)

SHUTOH ET AL.

Examiner

Arun S. Phasge

Art Unit

1724

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 25-31, 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sportouch in view of Shen of record for reasons of record.

Sportouch discloses thermoelectric materials; specifically compounds that have an MgAgAs type crystal structure, including compounds with the composition formula $Zr_xHf_yTi_zNiSn$ (abstract).

Regarding claim 25, Sportouch et al. disclose the use of these compounds as thermoelectric material. Also, Sportouch et al. require the compound to satisfy the condition of $x+y+z = 1$ (abstract and table 1). To vary any of these values x, y or z, within a narrower range outside of the range of the examples explicitly recited in the reference fails to overcome the disclosure of the reference. The reference teaches that the values of $x+y+z=1$, which is encompassed by the values presently recited.

The difference between Sportouch et al. and the claim is the requirement of a sintered body.

Shen teaches a process of preparing thermoelectric compounds by sintering instead of the commonly used arc melting method (abstract). The compounds are ZrNiSn based half-Heusler compounds with the MgAgAs type crystal structure (introduction).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the sintering method of Shen to create the half-Heusler compound of Sportouch et al. because the sintering method creates dense compounds with fine grain size and homogenous microstructure (Shen abstract). Because Shen and Sportouch are concerned with creating half-Heusler, ZrNiSn based thermoelectric compounds with MgAgAs type crystal structure, one would have a reasonable expectation of success from the combination. Thus the combination meets claims 25-31, 35-38. The type of arc-melting and/or quenching fails to further produce changes to the material, since there is no evidence that these method limitations produce changes to the material.

Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sportouch in view of Shen as applied to claim 25 above, and further in view of Hohl of record.

The disclosure of Sportouch in view of Shen is as stated above for claim 25.

The difference between Sportouch in view of Shen and the claims is the requirement of specific elements replacing some of the elements in the formula. Hohl et al. teaches efficient dopants for MgAgAs type structure materials.

Regarding claim 32, Hohl teaches doping by replacing Ti, Zr, or Hf with V, Nb, or Ta (section 3.1.2).

Regarding claim 33, Hohl teaches doping by replacing Ni with Fe, Co and Cu (section 3.1.3).

Regarding claim 34, Hohl teaches doping by replacing Sn with Sb, Bi, Ge, and Pb (section 3.1.4).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the doping materials of Hohl with the compound of Sportouch in view of Shen because the doped materials have better thermoelectric properties leading to increased figures of merit over undoped materials. Because Hohl and Sportouch in view of Shen are concerned with MgAgAs structured thermoelectric materials, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sportouch in view of Shen as applied to claim 25 above, and further in view of Bell of record.

The disclosure of Sportouch in view of Shen is as stated above for claim 25. Sportouch further discloses material is made n type. The difference between Sportouch in view of Shen and claim 39 is the requirement of a thermoelectric element.

Bell teaches a flexible thermoelectric circuit as shown in figure 1B. The thermoelectric element comprises n and p type materials alternatively connected in series. Bell further teaches that a variety of thermoelectric materials can be used within the device.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the device of Bell with the thermoelectric material of Sportouch in view of Shen because Bell allows for a multitude of thermoelectric materials to be utilized within the device and the material of Sportouch in view of Shen has improved thermal conductivity over the parent thermoelectric material. Because Sportouch in view of Shen and Bell are concerned with thermoelectric materials, one would have a reasonable expectation of success from the combination. Thus the combination meets the claim.

Response to Arguments

Applicant's arguments filed 4/7/10 have been fully considered but they are not persuasive.

Applicants have compared the newly recited limitations in the claims with the Sportouch reference to allege differences in the ZT values. However, it appears that the ZT values are not dependent upon the difference in amount of Zr used in the thermoelectric material. Indeed the values recited in the remarks shows a varied ZT value obtained by the use of differing amounts of the Ti, Zr and/or Hf.

The Sportouch reference teaches that different values can be used as long as the $x+y+z=1$ is maintained. To discover optimum values for these x, y and/or z subscripts would have been within the purview of the ordinary artisan, unless such values produce an unexpected result.

Accordingly, the claims are rejected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arun S. Phasge whose telephone number is (571) 272-1345. The examiner can normally be reached on MONDAY-THURSDAY, 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Arun S. Phasge/
Primary Examiner, Art Unit 1724

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